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(54) Title: METHOD OF PRECISION 3D PRINTED GLASSY CARBON

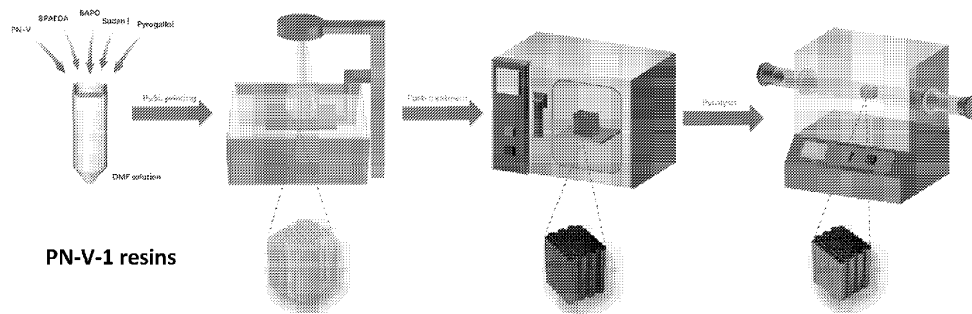


FIG. 9

(57) Abstract: Disclosed herein are the synthesis and characterisations of a monoacrylate-functionalised phthalonitriles (PN). Photopolymerisable resins are formulated based on the PN monomer, a commercial diacrylate and other additives. Being post thermally treated, the PN based resins result in polymeric products with excellent thermal and mechanical performances. The resins exhibit high carbon yield, indicating that they are promising candidates as carbon precursors. The resins have good three-dimensional (3D) printing capability. Complex 3D structured objects are herein printed using high-resolution projection micro-stereolithography (PpSL) additive manufacturing technology and performed follow-up post treatment. After being progressively pyrolyzed up to 1000 °C, the printed objects are readily converted to glassy carbon (GC) structures with structural integrity and fidelity. Only ~25% of shrinkage is found for the converted GC structure due to the significantly high char yield of the PN resins.

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